

SEQUENCE LISTING

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CHEN, ROUYING

<120> TRANSCRIPTION FACTOR STRESS-RELATED PROTEINS AND
METHODS OF USE IN PLANTS

<130> 16313-0030

<140> 09/828,303

<141> 2001-04-06

<150> 60/196,001

<151> 2000-04-07

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<170> PatentIn Ver. 2.1

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aacatgctaa cagaattgca cggtaaagga aaactgtact aggcattgta tatgggaatt 2580
cggatcgctt cttgcaatta aacacgctag cgccgtttgg tgccaatgtt attctggcat 2640
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<210> 14

<211> 2367

<212> DNA

<213> Physcomitrella patens

<400> 14

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gaagacatgg aaattccctt aggtcgagat ggcgagggta tgcagtcaaa gcagtgcctg 180
cgcgccactt ggcgtccagc ggaagacgac aagttgcgag aactagtgtc ccagtttgga 240
cctcaaaact ggaatctcat agcagagaaa cttcagggtc gatcagggaa aagctgcagg 300

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ctctttccgg	gccgcacaga	caacgcgggtg	agaatcact	ggcacgttgt	gacggcaaga	480
cagtcccgtg	aacggacacg	aacttacggc	cgatcaaaag	gtccgggtaca	tcgaagaggc	540
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caactttatc	tttttggttt	ttacgcttga	acggacctca	gctgtacaga	cactcatcat	2160
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gagactagtt	tagaaagatt	gatgaagcta	gcagtaaatt	gttggcctca	tctgaaagg	2340
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<210> 15

<211> 787

<212> DNA

<213> *Physcomitrella patens*

<400> 15

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cctgcccatc	gcgaacgtga	gccgaatcat	gaagaaggcg	ttgccgtcta	atgcaaaaat	240
ttcgaaggac	gcgaaagaga	ctgtgcagga	gtgtgtgtcc	gagttcatca	gcttcatcac	300
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gctgtggggc	atgagtacac	ttgggttcga	agattacgtg	gagcctctga	aggtttacct	420
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gatgctgcag	cagtcgtacg	gacagcagcg	acctccaggg	atgatgtatt	cccccatca	660
gatgatgccg	caataccaga	tgccaatgca	gtctgggtgga	aaccagcctc	gtggagtgta	720
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<210> 16
 <211> 1669
 <212> DNA
 <213> *Physcomitrella patens*

<400> 16
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 cgtggaacag gaggagtttc cgacggaatt tgatctgctg agactagaga gggccagggt 240
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 cgagcagagt tatgtgcaga agctagaatc gttgttggga ggtgtttcca cgctcgtccg 360
 tgaggaagag gaaactgcat ccgtttcaga agatgaagat gattcaaaca gcttacctca 420
 aattcaagta gccgttaaata cgaagcggaa gggagagagg aggaagaggc gggagcgcagc 480
 gttggaaaagg gcagagaagg ttgccaccga tcttgcatca gcacccccctc tcccaaaacc 540
 taagaaacca cagcttgctg cggatccttc agaccagctc cgtgcatatt tgcgagacat 600
 aggaaggacg aagttgctaa cagcaagaga agaagtcgat ctctctcatc aaattcagga 660
 tcttttgaag ttggagaata tcaagtctaa ccttgagcga gagataggaa ggaatgccac 720
 aattggagag tggagtagag cggtagggaat ggaacagaat gcatttgaag cgcgggttaa 780
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 gaaaaaggca tttggtaatg tttcgatcag aaagtagact gttacataag ttttcattct 1620
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<210> 17
 <211> 141
 <212> PRT
 <213> *Physcomitrella patens*

<400> 17
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 Arg Asn Ile Asp Leu Asn Lys Ala Pro Ser Ala Trp Asp Thr Glu Glu
 20 25 30
 Val Ser Ala Ser Asn Thr Gly Asp Thr Thr Ser Phe Arg Gly Val Arg
 35 40 45
 His Arg Pro Glu Leu Asn Lys Trp Val Thr Glu Ile Arg Pro Thr Ser
 50 55 60
 Gln Lys Arg Lys Ile Trp Leu Gly Thr Tyr Glu Thr Pro Glu Glu Ala
 65 70 75 80

10/32

Ala Arg Ala Tyr Asp Val Gly Ile Phe Tyr Thr Lys Lys Lys Ile Pro
85 90 95
Tyr Asn Phe Glu Asp Ser Pro Gln Gln Leu Gln Leu Tyr Pro Ile Pro
100 105 110
Pro Glu Leu Pro Trp Glu Ser Phe Ala Ala Leu Val Lys Gln Arg Ala
115 120 125
Thr Ser Ala Ala Lys Arg Ala Arg Val Pro Ser Ser Ser
130 135 140

<210> 18
<211> 337
<212> PRT
<213> Physcomitrella patens

<400> 18
Met Val Val Ala Val Ala Val Leu Phe Ala Val Val Leu Phe Ile Leu
1 5 10 15
Cys Leu His Ile Tyr Ala Lys Trp Phe Trp Arg Asn Gln Gly Ala Ile
20 25 30
Val Ala Ser Asp Gly Thr Leu Arg Thr Leu Ser Trp Arg Arg Arg Arg
35 40 45
Tyr Thr Val Pro Val Asn Ala Thr Pro Val Thr Gln Ala Val Gly Leu
50 55 60
Glu Arg Ala Val Ile Glu Ala Leu Pro Thr Phe Glu Phe Asp Gly Glu
65 70 75 80
Arg Ala Lys Arg Val Phe Glu Cys Ala Val Cys Leu Glu Glu Phe Glu
85 90 95
Leu Gly Glu Lys Gly Arg Thr Leu Pro Lys Cys Asp His Ser Phe His
100 105 110
Leu Asp Cys Ile Asp Met Trp Leu His Ser His Ser Thr Cys Pro Leu
115 120 125
Cys Arg Thr Ser Val Gly Ala Asp Glu Thr Glu Lys Lys Thr Glu Ala
130 135 140
Ala Thr Val Met Gln Ile Ser Glu Pro Pro Gln Met Glu Ala Pro Val
145 150 155 160
Met Gly Asp Val Gly Ala Pro Phe Met Ala Ala Met Arg Ala Ser Arg
165 170 175
Arg Ser Gln Arg Ser Arg Gly Gln Leu Pro Ala Leu Asn Ser Ser Pro
180 185 190
Arg Gly Asn Ser Leu Pro Arg Thr Ala Glu Asp Gln Gly Gly Glu Asn
195 200 205

His Arg Arg Ser Gly Thr Ser Glu Thr Ala Val Ala Val Asp Gln Gln
 210 215 220
 Gln Asn Ile Lys Asp Tyr Glu Thr Pro Ser Gly Ile Pro Ser Asn Val
 225 230 235 240
 Leu Phe Trp Gly Asn His Ala Gln Met Ser Ser Ala Gly Ala Gly Gly
 245 250 255
 Ser Ala Glu Ala Arg Ala Ala Ser Ser Ile Arg Ala Pro Phe Gln Val
 260 265 270
 Thr Ile Asp Ile Pro Arg Ser Gly Pro Ala Ala Val Ser Asn Ser Ser
 275 280 285
 Asn Val Leu Ser Pro Met Ala Arg Ala Ser Ala Ser Phe Arg Arg Leu
 290 295 300
 Leu Ser Arg Gly Lys Ser Val Val Ser Pro Gln Thr Gly Glu Asp Gly
 305 310 315 320
 Val Asp Glu Gly Gly Pro Ser Ser Ser Pro Arg Pro Pro Pro Pro His
 325 330 335
 Ala

<210> 19
 <211> 605
 <212> PRT
 <213> *Physcomitrella patens*

<400> 19

Met Thr Ala Leu Thr Asn Ser Glu Ala Lys Lys Lys Phe Glu Phe Leu
 1 5 10 15
 Glu Ala Val Ser Gly Thr Met Asp Ala His Leu Arg Tyr Phe Lys Gln
 20 25 30
 Gly Tyr Glu Leu Leu His Gln Met Glu Pro Tyr Ile His Gln Val Leu
 35 40 45
 Thr Tyr Ala Gln Gln Ser Arg Glu Arg Ala Asn Tyr Glu Gln Ala Ala
 50 55 60
 Leu Ala Asp Arg Met Gln Glu Tyr Arg Gln Glu Val Glu Arg Glu Ser
 65 70 75 80
 Gln Arg Ser Ile Asp Phe Asp Ser Ser Ser Gly Asp Gly Ile Gln Gly
 85 90 95
 Val Gly Arg Ser Ser His Lys Met Ile Glu Ala Val Met Gln Ser Thr
 100 105 110
 Pro Lys Gly Gln Ile Gln Thr Leu Lys Gln Gly Tyr Leu Leu Lys Arg
 115 120 125

Ser Thr Asn Leu Arg Gly Asp Trp Lys Arg Arg Phe Phe Val Leu Asp
 130 135 140
 Ser Arg Gly Met Leu Tyr Tyr Tyr Arg Lys Gln Trp Gly Lys Pro Thr
 145 150 155 160
 Asp Glu Lys Asn Val Ala His His Thr Val Asn Leu Leu Thr Ser Thr
 165 170 175
 Ile Lys Ile Asp Ala Glu Gln Ser Asp Leu Arg Phe Cys Phe Arg Ile
 180 185 190
 Ile Ser Pro Ala Lys Ser Tyr Thr Leu Gln Ala Glu Asn Ala Ile Asp
 195 200 205
 Arg Met Asp Trp Met Asp Lys Ile Thr Gly Val Ile Ser Ser Leu Leu
 210 215 220
 Asn Asn Gln Ile Ser Glu Gln Val Asp Gly Glu Asp Ser Asp Val Ser
 225 230 235 240
 Arg Ser Gly Ala Ser Asp Gln Ser Gly His Glu Arg Pro Leu Asp Val
 245 250 255
 Leu Arg Lys Val Lys Gly Asn Asp Ala Cys Ala Asp Cys Gly Ala Ala
 260 265 270
 Asp Pro Asp Trp Ala Ser Leu Asn Leu Gly Ile Leu Leu Cys Ile Glu
 275 280 285
 Cys Ser Gly Val His Arg Asn Met Ser Val Gln Ile Ser Lys Val Arg
 290 295 300
 Ser Leu Thr Leu Asp Val Lys Val Trp Glu Pro Ser Val Met Ser Tyr
 305 310 315 320
 Phe Gln Ser Val Gly Asn Ser Tyr Ala Asn Ser Ile Trp Glu Glu Leu
 325 330 335
 Leu Asn Pro Lys Ser Ser Glu Glu Ser Ser Glu Arg Asn Val Asn Asp
 340 345 350
 Glu Gly Gln Ser Gly Val Leu Ser Ala Ser Arg Ala Arg Pro Arg Pro
 355 360 365
 Arg Asp Pro Ile Pro Ile Lys Glu Arg Phe Ile Asn Ala Lys Tyr Val
 370 375 380
 Glu Lys Lys Phe Val Gln Lys Leu Lys Val Asp Ser Arg Gly Pro Ser
 385 390 395 400
 Val Thr Arg Gln Ile Trp Asp Ala Val Gln Asn Lys Lys Val Gln Leu
 405 410 415
 Ala Leu Arg Leu Leu Ile Thr Ala Asp Ala Asn Ala Asn Thr Thr Phe
 420 425 430

Glu Gln Val Met Gly Gly Thr Glu Ser Ser Trp Ser Ser Pro Leu Ala
 435 440 445
 Ser Leu Ala Gly Ala Leu Leu Arg Lys Asn Ser Leu Ser Ala Ser Gln
 450 455 460
 Ser Gly Arg Arg Asn Trp Ser Val Pro Ser Leu Leu Ser Ser Pro Asp
 465 470 475 480
 Asp Pro Gly Ser Arg Ser Gly Ala Leu Ser Pro Val Ser Arg Ser Pro
 485 490 495
 Asp Ala Ala Gly Ser Gly Gly Ile Asp Glu Lys Asp Leu Arg Gly Cys
 500 505 510
 Ser Leu Leu His Val Ala Cys Gln Ile Gly Asp Ile Ser Leu Ile Glu
 515 520 525
 Leu Leu Leu Gln Tyr Gly Ala Gln Ile Asn Cys Val Asp Thr Leu Gly
 530 535 540
 Arg Thr Pro Leu His His Cys Val Leu Cys Gly Asn Asn Ser Cys Ala
 545 550 555 560
 Lys Leu Leu Leu Thr Arg Gly Ala Lys Ala Gly Ala Val Asp Lys Glu
 565 570 575
 Gly Lys Thr Pro Leu Glu Cys Ala Val Glu Lys Leu Gly Ala Ile Thr
 580 585 590
 Asp Glu Glu Leu Phe Ile Met Leu Ser Glu Thr Ser Arg
 595 600 605

<210> 20
 <211> 188
 <212> PRT
 <213> *Physcomitrella patens*

<400> 20
 Met Ala Thr Glu Arg Val Ser Gln Glu Thr Thr Ser Gln Ala Pro Glu
 1 5 10 15
 Gly Pro Val Met Cys Lys Asn Leu Cys Gly Phe Phe Gly Ser Gln Ala
 20 25 30
 Thr Met Gly Leu Cys Ser Lys Cys Tyr Arg Glu Thr Val Met Gln Ala
 35 40 45
 Lys Met Thr Ala Leu Ala Glu Gln Ala Thr Gln Ala Ala Gln Ala Thr
 50 55 60
 Ser Ala Thr Ala Ala Ala Val Gln Pro Pro Ala Pro Val His Glu Thr
 65 70 75 80
 Lys Leu Thr Cys Glu Val Glu Arg Thr Met Ile Val Pro His Gln Ser
 85 90 95

Ser Ser Tyr Gln Gln Asp Leu Val Thr Pro Ala Ala Ala Ala Pro Gln
 100 105 110

Ala Val Lys Ser Ser Ile Ala Ala Pro Ser Arg Pro Glu Pro Asn Arg
 115 120 125

Cys Gly Ser Cys Arg Lys Arg Val Gly Leu Thr Gly Phe Lys Cys Arg
 130 135 140

Cys Gly Asn Leu Tyr Cys Ala Leu His Arg Tyr Ser Asp Lys His Thr
 145 150 155 160

Cys Thr Tyr Asp Tyr Lys Ala Ala Gly Gln Glu Ala Ile Ala Lys Ala
 165 170 175

Asn Pro Leu Val Val Ala Glu Lys Val Val Lys Phe
 180 185

<210> 21

<211> 714

<212> PRT

<213> *Physcomitrella patens*

<400> 21

Met Pro Gly Pro Val Pro Leu Leu Ser Met Ser Val Lys Ser Glu Ser
 1 5 10 15

Leu Asp Asp Ile Gly Gly His Glu Lys Lys Ser Val Thr Gly Ser Glu
 20 25 30

Val Gly Gly Leu Asp Ala Gln Leu Trp His Ala Cys Ala Gly Gly Met
 35 40 45

Val Gln Leu Pro His Val Gly Ala Lys Val Val Tyr Phe Pro Gln Gly
 50 55 60

His Gly Glu Gln Ala Ala Ser Thr Pro Glu Phe Pro Arg Thr Leu Val
 65 70 75 80

Pro Asn Gly Ser Val Pro Cys Arg Val Val Ser Val Asn Phe Leu Ala
 85 90 95

Asp Thr Glu Thr Asp Glu Val Phe Ala Arg Ile Cys Leu Gln Pro Glu
 100 105 110

Ile Gly Ser Ser Ala Gln Asp Leu Thr Asp Asp Ser Leu Ala Ser Pro
 115 120 125

Pro Leu Glu Lys Pro Ala Ser Phe Ala Lys Thr Leu Thr Gln Ser Asp
 130 135 140

Ala Asn Asn Gly Gly Gly Phe Ser Ile Pro Arg Tyr Cys Ala Glu Thr
 145 150 155 160

Ile Phe Pro Pro Leu Asp Tyr Cys Ile Asp Pro Pro Val Gln Thr Val
 165 170 175

Leu Ala Lys Asp Val His Gly Glu Val Trp Lys Phe Arg His Ile Tyr
 180 185 190
 Arg Gly Thr Pro Arg Arg His Leu Leu Thr Thr Gly Trp Ser Thr Phe
 195 200 205
 Val Asn Gln Lys Lys Leu Val Ala Gly Asp Ala Ile Val Phe Leu Arg
 210 215 220
 Ile Ala Ser Gly Glu Leu Cys Val Gly Val Arg Arg Ser Met Arg Gly
 225 230 235 240
 Val Ser Asn Gly Glu Ser Ser Ser Trp His Ser Ser Ile Ser Asn Ala
 245 250 255
 Ser Thr Ile Arg Pro Ser Arg Trp Glu Val Lys Gly Thr Glu Ser Phe
 260 265 270
 Ser Asp Phe Leu Gly Gly Val Gly Asp Asn Gly Tyr Ala Leu Asn Ser
 275 280 285
 Ser Ile Arg Ser Glu Asn Gln Gly Ser Pro Thr Thr Ser Ser Phe Ala
 290 295 300
 Arg Asp Arg Ala Arg Val Thr Ala Lys Ser Val Leu Glu Ala Ala Ala
 305 310 315 320
 Leu Ala Val Ser Gly Glu Arg Phe Glu Val Val Tyr Tyr Pro Arg Ala
 325 330 335
 Ser Thr Ala Glu Phe Cys Val Lys Ala Gly Leu Val Lys Arg Ala Leu
 340 345 350
 Glu Gln Ser Trp Tyr Ala Gly Met Arg Phe Lys Met Ala Phe Glu Thr
 355 360 365
 Glu Asp Ser Ser Arg Ile Ser Trp Phe Met Gly Thr Ile Ala Ala Val
 370 375 380
 Gln Ala Ala Asp Pro Val Leu Trp Pro Ser Ser Pro Trp Arg Val Leu
 385 390 395 400
 Gln Val Thr Trp Asp Glu Pro Asp Leu Leu Gln Gly Val Asn Arg Val
 405 410 415
 Ser Pro Trp Gln Leu Glu Leu Val Ala Thr Leu Pro Met Gln Leu Pro
 420 425 430
 Pro Val Ser Leu Pro Lys Lys Lys Leu Arg Thr Val Gln Pro Gln Glu
 435 440 445
 Leu Pro Leu Gln Pro Pro Gly Leu Leu Ser Leu Pro Leu Ala Gly Thr
 450 455 460
 Ser Asn Phe Gly Gly His Leu Ala Thr Pro Trp Gly Ser Ser Val Leu
 465 470 475 480

Leu Asp Asp Ala Ser Val Gly Met Gln Gly Ala Arg His Asp Gln Phe
 485 490 495
 Asn Gly Leu Pro Thr Val Asp Phe Arg Asn Ser Asn Tyr Lys His Pro
 500 505 510
 Arg Glu Phe Ser Arg Asp Asn Gln Tyr Gln Ile Gln Asp His Gln Val
 515 520 525
 Phe His Pro Arg Pro Val Leu Asn Glu Pro Pro Ala Thr Asn Thr Gly
 530 535 540
 Asn Tyr Phe Ser Leu Leu Pro Ser Leu Gln Arg Arg Pro Asp Ile Ser
 545 550 555 560
 Pro Ser Ile Gln Pro Leu Ala Phe Met Ser Ala Ser Gly Ser Ser Gln
 565 570 575
 Leu Glu Thr Ser Ser Thr Lys Thr Ala Ala Thr Ser Phe Phe Leu Phe
 580 585 590
 Gly Gln Phe Ile Asp Pro Ser Cys Thr Ser Lys Pro Gln Gln Arg Ser
 595 600 605
 Thr Val Ile Asn Asn Ala Ser Val Ala Gly Asp Gly Lys His Pro Gly
 610 615 620
 Thr Asn Asn Ser Ser Ser Asp Asn Lys Ser Glu Asp Lys Asp Asn Cys
 625 630 635 640
 Arg Asp Val Gln Pro Ile Leu Asn Gly Ile Ala Val Arg Ser Gly Phe
 645 650 655
 Arg Ala Asp Ile Ala Ala Lys Lys Phe Gln Gln Ser Asp Ser Ala His
 660 665 670
 Pro Thr Glu Ala Ser Arg Gly Ser Gln Val Ser Ser Leu Pro Trp Trp
 675 680 685
 Gln Thr Gln Asp Ala His Lys Asp Gln Glu Phe His Gly Asp Ser Gln
 690 695 700
 Thr Pro His Thr Pro Ala Ser Gly Ser Gln
 705 710

<210> 22

<211> 469

<212> PRT

<213> Physcomitrella patens

<400> 22

Met Lys Glu Leu Asn Glu Asp Met Glu Ile Pro Leu Gly Arg Asp Gly
 1 5 10 15
 Glu Gly Met Gln Ser Lys Gln Cys Pro Arg Gly His Trp Arg Pro Ala
 20 25 30

Glu Asp Asp Lys Leu Arg Glu Leu Val Ser Gln Phe Gly Pro Gln Asn
 35 40 45
 Trp Asn Leu Ile Ala Glu Lys Leu Gln Gly Arg Ser Gly Lys Ser Cys
 50 55 60
 Arg Leu Arg Trp Phe Asn Gln Leu Asp Pro Arg Ile Asn Arg His Pro
 65 70 75 80
 Phe Ser Glu Glu Glu Glu Glu Arg Leu Leu Ile Ala His Lys Arg Tyr
 85 90 95
 Gly Asn Lys Trp Ala Leu Ile Ala Arg Leu Phe Pro Gly Arg Thr Asp
 100 105 110
 Asn Ala Val Lys Asn His Trp His Val Val Thr Ala Arg Gln Ser Arg
 115 120 125
 Glu Arg Thr Arg Thr Tyr Gly Arg Ile Lys Gly Pro Val His Arg Arg
 130 135 140
 Gly Lys Gly Asn Arg Ile Asn Thr Ser Ala Leu Gly Asn Tyr His His
 145 150 155 160
 Asp Ser Lys Gly Ala Leu Thr Ala Trp Ile Glu Ser Lys Tyr Ala Thr
 165 170 175
 Val Glu Gln Ser Ala Glu Gly Leu Ala Arg Ser Pro Cys Thr Gly Arg
 180 185 190
 Gly Ser Pro Pro Leu Pro Thr Gly Phe Ser Ile Pro Gln Ile Ser Gly
 195 200 205
 Gly Ala Phe His Arg Pro Thr Asn Met Ser Thr Ser Pro Leu Ser Asp
 210 215 220
 Val Thr Ile Glu Ser Pro Lys Phe Ser Asn Ser Glu Asn Ala Gln Ile
 225 230 235 240
 Ile Thr Ala Pro Val Leu Gln Lys Pro Met Gly Asp Pro Arg Ser Val
 245 250 255
 Cys Leu Pro Asn Ser Thr Val Ser Asp Lys Gln Gln Val Leu Gln Ser
 260 265 270
 Asn Ser Ile Asp Gly Gln Ile Ser Ser Gly Leu Gln Thr Ser Ala Ile
 275 280 285
 Val Ala His Asp Glu Lys Ser Gly Val Ile Ser Met Asn His Gln Ala
 290 295 300
 Pro Asp Met Ser Cys Val Gly Leu Lys Ser Asn Phe Gln Gly Ser Leu
 305 310 315 320
 His Pro Gly Ala Val Arg Ser Ser Trp Asn Gln Ser Leu Pro His Cys
 325 330 335

Phe	Gly	His	Ser	Asn	Lys	Leu	Val	Glu	Cys	Arg	Ser	Ser	Thr	Gly	340	345	350	
Ala	Cys	Thr	Glu	Arg	Ser	Glu	Ile	Leu	Gln	Glu	Gln	His	Ser	Ser	Leu	355	360	365
Gln	Phe	Lys	Cys	Ser	Thr	Ala	Tyr	Asn	Thr	Gly	Arg	Tyr	Gln	His	Glu	370	375	380
Asn	Leu	Cys	Gly	Pro	Ala	Phe	Ser	Gln	Gln	Asp	Thr	Ala	Asn	Glu	Val	385	390	395
Ala	Asn	Phe	Ser	Thr	Leu	Ala	Phe	Ser	Gly	Leu	Val	Lys	His	Arg	Gln	405	410	415
Glu	Arg	Leu	Cys	Lys	Asp	Ser	Gly	Ser	Ala	Leu	Lys	Leu	Gly	Leu	Ser	420	425	430
Trp	Val	Thr	Ser	Asp	Ser	Thr	Leu	Asp	Leu	Ser	Val	Ala	Lys	Met	Ser	435	440	445
Ala	Ser	Gln	Pro	Glu	Gln	Ser	Ala	Pro	Val	Ala	Phe	Ile	Asp	Phe	Leu	450	455	460
Gly	Val	Gly	Ala	Ala												465		

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<210> 23
<211> 218
<212> PRT
<213> Physcomitrella patens
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<400> 23
Met Ala Asp Ser Tyr Gly His Asn Ala Gly Ser Pro Glu Ser Ser Pro
  1          5          10          15
His Ser Asp Asn Glu Ser Gly Gly His Tyr Arg Asp Gln Asp Ala Ser
          20          25          30
Val Arg Glu Gln Asp Arg Phe Leu Pro Ile Ala Asn Val Ser Arg Ile
          35          40          45
Met Lys Lys Ala Leu Pro Ser Asn Ala Lys Ile Ser Lys Asp Ala Lys
          50          55          60
Glu Thr Val Gln Glu Cys Val Ser Glu Phe Ile Ser Phe Ile Thr Gly
          65          70          75          80
Glu Ala Ser Asp Lys Cys Gln Arg Glu Lys Arg Lys Thr Ile Asn Gly
          85          90          95
Asp Asp Leu Leu Trp Ala Met Ser Thr Leu Gly Phe Glu Asp Tyr Val
          100          105          110
Glu Pro Leu Lys Val Tyr Leu His Lys Tyr Arg Glu Leu Glu Gly Glu
          115          120          125

```

Lys Ala Ser Thr Ala Lys Gly Gly Asp Gln Gln Gly Gly Lys Glu Gly
 130 135 140
 Ser Gln Gly Val Met Gly Ser Met Gly Met Ser Gly Gly Met Asn Gly
 145 150 155 160
 Met Asn Gly Thr Met Asn Gly Asn Met His Gly His Gly Ile Pro Val
 165 170 175
 Ser Met Gln Met Leu Gln Gln Ser Tyr Gly Gln Gln Ala Pro Pro Gly
 180 185 190
 Met Met Tyr Ser Pro His Gln Met Met Pro Gln Tyr Gln Met Pro Met
 195 200 205
 Gln Ser Gly Gly Asn Gln Pro Arg Gly Val
 210 215

 <210> 24
 <211> 412
 <212> PRT
 <213> *Physcomitrella patens*

 <400> 24
 Met Met Glu Ala Glu Gln Ser Tyr Val Gln Lys Leu Glu Ser Leu Leu
 1 5 10 15
 Gly Gly Val Ser Thr Leu Val Arg Glu Glu Glu Glu Thr Ala Ser Val
 20 25 30
 Ser Glu Asp Glu Asp Asp Ser Asn Ser Leu Pro Gln Ile Gln Val Ala
 35 40 45
 Val Lys Ser Lys Arg Lys Gly Glu Arg Arg Lys Arg Arg Glu Arg Ala
 50 55 60
 Leu Glu Arg Ala Glu Lys Val Ala Thr Asp Leu Ala Ser Ala Pro Pro
 65 70 75 80
 Leu Pro Lys Pro Lys Lys Pro Gln Leu Ala Ala Asp Pro Ser Asp Pro
 85 90 95
 Val Arg Ala Tyr Leu Arg Asp Ile Gly Arg Thr Lys Leu Leu Thr Ala
 100 105 110
 Arg Glu Glu Val Asp Leu Ser His Gln Ile Gln Asp Leu Leu Lys Leu
 115 120 125
 Glu Asn Ile Lys Ser Asn Leu Glu Arg Glu Ile Gly Arg Asn Ala Thr
 130 135 140
 Ile Gly Glu Trp Ser Arg Ala Val Gly Met Glu Gln Asn Ala Phe Glu
 145 150 155 160
 Ala Arg Leu Lys Lys Gly Arg Phe Ala Lys Asp Lys Met Val Asn Ser
 165 170 175

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Asn Leu Arg Leu Val Val Ser Ile Ala Lys Asn Tyr Gln Gly Arg Gly
180 185 190

Met Thr Leu Gln Asp Leu Ile Gln Glu Gly Ser Met Gly Leu Val Arg
195 200 205

Gly Ala Glu Lys Phe Asp Pro Thr Lys Gly Phe Lys Phe Ser Thr Tyr
210 215 220

Ala His Trp Trp Ile Arg Gln Ala Val Thr Arg Ser Ile Ala Asp Gln
225 230 235 240

Ser Arg Thr Phe Arg Leu Pro Ile His Leu Tyr Glu Val Ile Ser Arg
245 250 255

Ile Asn Lys Ala Lys Arg Met Leu Val Gln Glu His Gly Arg Glu Ala
260 265 270

Arg Asn Glu Glu Val Ala Glu Leu Val Gly Leu Thr Val Glu Lys Leu
275 280 285

Lys Ser Val Val Lys Ser Ala Lys Ala Pro Gly Ser Met Glu Arg Pro
290 295 300

Ile Gly Lys Asp Gly Asp Thr Thr Leu Gly Glu Leu Val Ala Asp Thr
305 310 315 320

Asp Val Asp Ser Pro Glu Asp Ala Ile Val Lys Gln Leu Met Arg Gln
325 330 335

Asp Ile Glu Gly Val Leu Arg Thr Leu Asn Pro Arg Glu Arg Glu Val
340 345 350

Leu Arg Leu Arg Phe Gly Leu Asp Asp Gly Arg Ser Lys Thr Leu Glu
355 360 365

Glu Ile Gly Gln Ile Phe Lys Ala Thr Arg Glu Arg Ile Arg Gln Ile
370 375 380

Glu Ala Lys Ala Met Arg Lys Leu Arg Gln Pro Ser Arg Asn Ser Ile
385 390 395 400

Leu Arg Glu Tyr Leu Asp Val Lys Ser Asp Ala Ile
405 410

<210> 25

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 25

caggaaacag ctatgacc

<210> 26
 <211> 19
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 26
 ctaaagggaa caaaagctg

19

<210> 27
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 27
 tgtaaaacga cggccagt

18

<210> 28
 <211> 34
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 28
 atccccgggca gcgagcacac agctagcaac tctt

34

<210> 29
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 29
 gcgagctcac tccctcacgc ggttgacaat ct

32

<210> 30
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 30
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25

<210> 31
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 <212> DNA
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<220>
 <223> Description of Artificial Sequence: Primer

<400> 31
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33

<210> 32
 <211> 34
 <212> DNA
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<220>
 <223> Description of Artificial Sequence: Primer

<400> 32
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34

<210> 33
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 33
 cagcgaagcc caatcgggat cagca

25

<210> 34
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 34
 atccccgggag gaggacttgc ggaatgcaaa tc

32

<210> 35
 <211> 33
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 35
 gcgatatcca cctgcttcca ctctctactt atg 33

<210> 36
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 36
 gacacccgat tgagccggca agacg 25

<210> 37
 <211> 33
 <212> DNA
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<220>
 <223> Description of Artificial Sequence: Primer

<400> 37
 atcccgggca ccagtcccg c ttagtgtgtg tgt 33

<210> 38
 <211> 31
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 38
 gcgagctctt gatgcgactc gctctctcga t 31

<210> 39
 <211> 26
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 39
 cggcgagtgc agcagcttct agaacg 26

<210> 40
 <211> 31
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 40

atccccgggta tcgatctgga gcccgttgca a

31

<210> 41

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 41

gcgagctcct ccaaaggact ttgaaatata gc

32

<210> 42

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 42

gatatcggaa gaagaatcca agggaatgcg gtt

33

<210> 43

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 43

gcgagctcta tgcttccgtg ggaggagctt cac

33

<210> 44

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 44

ccggctgggt tgcctcagct tgcgca

26

<210> 45

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 45

cgctccatcg aacctggtgc ctttgc

26

<210> 46

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 46

atccccgggct cggaaggact gtgcattgtc ga

32

<210> 47

<211> 33

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Primer

<400> 47

gcgagctcgc agcagaagaa atccacttct ggt

33

<210> 48

<211> 26

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Primer

<400> 48

gggtgccggt tgatgcgagg gtccag

26

<210> 49

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 49

atccccgggct gttgtgtaca gtctgtgga

29

<210> 50

<211> 32

<212> DNA
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<220>
 <223> Description of Artificial Sequence: Primer

<400> 50
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32

<210> 51
 <211> 30
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<220>
 <223> Description of Artificial Sequence: Primer

<400> 51
 gcgctgcaga ttccatttgg agaggacacg

30

<210> 52
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 <212> DNA
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<220>
 <223> Description of Artificial Sequence: Primer

<400> 52
 cgcgccggc ctcagaagaa ctcgtcaaga aggcg

35

<210> 53
 <211> 25
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<220>
 <223> Description of Artificial Sequence: Primer

<400> 53
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25

<210> 54
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 54
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32

<210> 55
<211> 34
<212> DNA
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<220>
<223> Description of Artificial Sequence: Primer

<400> 55
gcgagctctg gccgtaaaat cagttgtggc gctt

34

<210> 56
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 56
gcgatatcca cctgcttcca ctctctactt atg

33

<210> 57
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 57
gcgagctctt gatgcgactc gctctctcga t

31

<210> 58
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 58
gcgagctcct ccaaaggact ttgaaatata gc

32

<210> 59
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 59
gcgagctcta tgcttccgtg ggaggagctt cac

33

<210> 60
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 60
gcgagctcgc agcagaagaa atccacttct ggt

33

<210> 61
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 61
atcccgggct cacggagtaa aggccgtacc tt

32

<210> 62
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 62
atcccgggca gcgagcacac agctagcaac tctt

34

<210> 63
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 63
gcgagctcac tccctcacgc gggtgacaat ct

32

<210> 64
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 64
gcccggttggtg tcgcacgagt gtggga

26

<210> 65
<211> 25
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 65
gccgctggac cagacctcgg aatgt

25

<210> 66
<211> 25
<212> DNA
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<220>

<223> Description of Artificial Sequence: Primer

<400> 66
gaggcagtca tgcaatcgac ccaa

25

<210> 67
<211> 26
<212> DNA
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<220>

<223> Description of Artificial Sequence: Primer

<400> 67
gcgaagccca atcgggatca gcagca

26

<210> 68
<211> 33
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 68
atcccgggca ccagtcccgc ttagtgtgtg tgt

33

<210> 69
<211> 31
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 69

gcgagctctt gatgcgactc gctctctcga t

31

<210> 70

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 70

cgcacgcacat ctggcgaact ttgtg

25

<210> 71

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 71

cgtaccacga ttgctctagc gcacgt

26

<210> 72

<211> 35

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 72

gcgatatcgg aagaagaatc caagggaatg cggtt

35

<210> 73

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 73

gcgagctcta tgcttcctg ggaggagctt cac

33

<210> 74

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 74

atcccgggca gcgagcacac agctagcaac tctt

34

<210> 75

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 75

gcgagctcac tccctcacgc ggttgacaat ct

32

<210> 76

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 76

gcccgttggtg tcgcacgagt gtggga

26

<210> 77

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 77

gccgctggac cagacctcgg aatgt

25

<210> 78

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 78

gaggcagtca tgcaatcgac cccaa

25

<210> 79

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 79

gcgaagccca atcgggatca gcagca